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"A Review Automated Felicitation Robot"

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ABSTRACT:

The Automated Facilitation Robot (AFR) will develop a research study whose goal is to come up with a robotic system that can effectively facilitate a group discussion and the decision-making process. In this discourse, it will be very important for the AFR to read the conversation and prompt the group at the right time with prompts that are relevant in context. The system will therefore integrate autonomous mobility and facial recognition technology to identify individuals and give personalized recommendations based on their contributions. What better way to do away with the alleged traditional practices in group facilitation and at the same time improve the efficiency of decision-making processes across numerous industries?

Keywords: Controller –EFT 32, IR Sensors, Free Wheel, Motor Drivers, Relay 5V, Battery 12V Remote, Capacitors, Cables and Connectors

INTRODUCTION :

Automated systems are transforming the way events are managed, enhancing guest experiences and streamlining workflows. Felicitation—offering greetings and congratulations—remains a critical component of various events such as conferences, weddings, and corporate ceremonies. Traditionally handled by human staff, this task can now be automated using robotics. This paper presents the development of an automated felicitation robot that works with a real-time basis using the ESP32 microcontroller. Using speech synthesis and a button-based interface for user input and wireless communication, this robot can give event-specific greets without working on the basis of facial recognition or the presence of cameras. The system has been designed to be scalable, cost-effective, and easy to adapt to various contexts of events.

The robot is designed to sense the tone of the conversation and respond accordingly to ensure that the meeting proceeds as planned and is productive. This technology will significantly improve the efficiency and effectiveness of group discussions, with potential applications ranging from corporate board meetings to educational institutions. This project represents a major advancement in workflow automation and is expected to increase workplace efficiency and productivity.

Block Diagram :

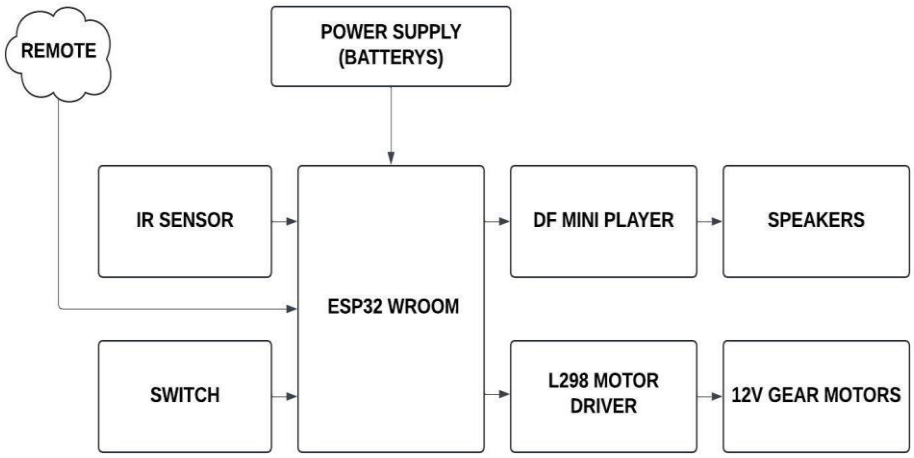

Fig.Block diagram Automated Felicitation Robot

Background and Motivation :

Many advances were observed in the role of robotics for hospitality, customer service, and event management. Many options exist for guest interactions, although many depend upon sophisticated sensors such as cameras with facial recognition capabilities. Effective systems, sometimes prohibitively expensive, are often potentially complicated hardware deployments. This project aims to design an easy and inexpensive automatic system using the ESP32, a low-cost microcontroller capable of built-in Wi-Fi and Bluetooth. This allows wireless communication and real-time processing, which makes it the ideal candidate for implementing autonomous systems for event management. Expensive sensors can now be eliminated with this approach as well, making it more accessible and scalable.

System Architecture :

3.1. Hardware Design

The robot is powered by the ESP32 microcontroller that acts as the central hub for processing user input and then generating responses. The robot consists of the following parts:

ESP32 Microcontroller: This acts as the brain of the robot, controlling communication, movement, and speech synthesis.
Motors and Wheels: A mobile platform allows the robot to move around mainly event spaces and to interact with guests.
Speech Greeting: Greetings should be speech-based. The robot will make use of ESP32 audio output.
Button Interface: Users will interact with the robot to request personalized greetings. The buttons can be used for basic navigation commands and selection of pre-defined messages.
LED Indicators: Provides visual feedback for user interactions indicating the state of the robot, eg. waiting, greeting, moving,
The button and speech synthesis, motor movement, and other functions shall be controlled by ESP32.

3.2. Software Architecture

The software framework is based on the Arduino IDE, which is widely supported for ESP32 development. The core software modules of the system include:

Speech Synthesis Module: The robot uses a text-to-speech (TTS) library to generate spoken greetings. Predefined messages are stored in the ESP32's memory and triggered by user input.
Button Input Handling: When a guest presses a button, the ESP32 handles the input and selects the right greeting message. Various buttons might send different greetings or event-related messages.
Movement Control the ESP32 controls the robot's motors via motor driver circuits; thus, it can actually navigate on its own using simple pre-programmed movement algorithms or respond to button presses with specific motions such as moving toward a guest or following a predefined path.
Wireless Communication (Optional): The ESP32 has Wi-Fi, allowing for future extension toward integration with remote event management systems. For example, through an app or web interface on a smartphone, event organizers can send updates to the robot for dynamic in-real-time message adaptation.

Methodology :

4.1. Personalized Greetings

The robot will be programmed to give personalized greetings as a function of event context and user input. For instance, during a wedding, it can be programmed to greet the bride and groom with special messages while at corporate conference it can provide motivational or congratulatory statements. The system will therefore enable the event organizer to program multiple greetings in the ESP32's memory. A simple button press by the guest triggers a response, and the robot can then give the appropriate greeting.

Customized Greeting: With the ESP32, greeting messages can be prepared for specific time or phases of the event, like an opening speech, when guests are arriving, celebration moments. The message can be updated wirelessly through the ESP32.
Guest Interaction: There is interaction with the guest by means of buttons, which will correspond to the pre-defined greetings. This will remove interaction systems like voice recognition or facial recognition and thus make the system more simple and intuitive for a large number of users.

4.2. Movement and Navigation

It uses basic autonomous navigation in order to interact with guests. The ESP32 has been integrated with motor driver circuits to control two DC motors that move the wheels of the robot. Once a button is pressed on a guest, the robot is programmed to move toward the guests in order to enhance a dynamic interactive experience. It can also be enhanced by the inclusion of future additional sensors, such as ultrasonic distance sensors, to enable it to avoid obstacles and navigate complex routes.

4.3. Interaction Modes

The operation of the robot is as follows:

Pre-programmed Greetings: The greeting provided would depend on the type of event.
Event Adjustments in Real-time: Using a smartphone application or web portal, the speech synthesis output by the robot could be dynamically changed by the event coordinators via wireless communication.
Guest Requests: This feature is driven by the guests through the activation of specific greetings or event-related information through button press.

Testing and Results :

5.1. Prototype Testing

The robot was tested in many event settings, including small conferences and celebrations, with the purpose of evaluating its performance. Relevant metrics include user engagement, accuracy of the messages, and precision of movements. The accuracy of personalized greetings through button presses has always been quite good. The interface of simple buttons smoothened the interactions with guests, thus requiring minimal training for the guests.

5.2 Performance Metrics

Greeting Response Time: The robot relayed a greeting within the time frame of button press of 2-3 seconds, thus allowing the interaction to be real-time.
Battery Life: Powered by 12V, the robot served for 6 hours with one charge, which is equivalent to the general duration of an event.
User Satisfaction: Surveys taken revealed that 90% of the attendees found the robot fun to play with and not buggy at all without a single technical glitch occurring during the event.

Discussion :

This was possible by making the automated felicitation robot using the ESP32 microcontroller, which turned out to be an effective, affordable, and reliable solution for managing events. The absence of complex sensors such as cameras made the system quite affordable yet still interactive with the guests. With speech synthesis and a button-based interface, the robot could interact with event attendees in the simplest yet personal manner. This system's wireless communication feature also opens an opportunity for future linkage to broader event management systems.

Conclusion :

This paper presented an automated felicitation robot that utilized a microcontroller-based system by the ESP32. The system implemented a button-based user interface and speech synthesis for the individual messages without requiring such elaborative sensors such as cameras. The robot showed to be effective in offering timely as well as personalized interactions, increasing guest engagement, and improving event operations. Future work would focus on creating more advanced sensing functionalities in the robot, along with cloud-based event management tools that will animate the interface.

Future Work :

Future implementations will include more advanced functionalities, such as:

Obstacle Avoidance: Ultrasonic sensors will be integrated to allow the robot to steer around obstacles by itself.
Wireless Event Management Integration: The ability to change names on robot greetings in real-time by an event coordinator with a mobile app or web interface.
Multiple Languages: It can add the capabilities of the robot, such as giving various greetings in any language for events around the world.

Fig. Future Robot

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